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A comprehensive study of noble gases and nitrogen in a diamond-rich pebble from Egypt

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In a follow-up study of [1] we measured noble gases and nitrogen (CRPG Nancy, ETH Zürich, IPG Paris) on a very unusual diamond-rich rock fragment ("Hypatia") from the Libyan Desert Glass strewn field [2]. TEM & XRD work (Univ. Jena) indicate ubiquitous diamond & lonsdaleite, suggesting an impact origin. Noble gas and N elements and isotopes confirm [1] that Hypatia is extraterrestrial. Unlike [1], we find, however, "normal" isotopic patterns as often observed in meteoritic matter. In particular, these signatures bear similarities (but also some differences) with those observed in several carbon-rich meteorite samples, e. g., ureilites, graphite nodules in iron meteorites, or graphite in acapulcoites-lodranites. We conclude that Hypatia represents an fascinating type of extraterrestrial matter, but we find no clear evidence for a cometary connection, as had been advocated by [1] and criticized by [3].

[1] Kramers J. D. et al. (2013) EPSL, 382, 21-31. [2]

Avice G. et al. (2015) EPSL, in press. [3] Reimold, W.U. and Koeberl, C. (2014). J. African Earth Sci. 93, 57–175.

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